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Studies on Preparation and Sensory evaluation of turmeric incorporated paneer

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Abstract

The main objective of present investigation was to study the effect of addition different levels of turmeric powder on preparation and sensory evaluation of paneer. During the study cow milk paneer incorporated with turmeric was analyzed for sensory properties such as colour and appearance, flavour, body and texture and overall acceptability. Storage study on the base of sensory evaluation was carried out with 3 days of interval. The data were statistically analysed by using Completely Randomized Design (CRD). The paneer prepared by adding 0.6 per cent turmeric powder showed highest overall acceptability sensory score 8.36. The sensory quality of paneer prepared by addition of 0.6 per cent having score for colour and appearance 8.08, flavour 8.20, body and texture 7.70 and overall acceptability 8.36. The paneer sample with 0.6 per cent turmeric weight of expected yield of paneer remains acceptable upto 12th day of storage at refrigerated temperature.

Keywords: Turmeric powder, paneer, sensory evaluation etc.

Introduction

Milk plays an important role in the diet of such persons as a source of animal proteins. India is the largest milk producer in the world with a production of 191MT in 2018-19, with per capita availability of milk 394 g/day. About 55% of the total production is buffalo milk and then cow milk rank second in total milk production.

Paneer represents one of the soft varieties of cheese family and is used in culinary dishes/snacks. About 5% of milk produced in India is converted into paneer (Chandan, 2007)^[2]. Paneer contains all the milk constituents except for loss of some soluble whey proteins, lactose and minerals (Singh and Kanawjia 1988)^[7]. Paneer has a fairly high level of fat (22–25%) and protein (16–18%) and a low level of lactose (2.0–2.7%) (Kanawjia and Singh, 1996)^[4].

In recent years many attempts have put emphasis on the search for natural antimicrobial substances that can properly serve the needs of food manufacturers and consumers. Various herbs and spices have been recognized for their antimicrobial activity and used throughout the past as an alternative approach to preserve foods. Herbs and spices have also been well known for their medicinal, preservative and antioxidant properties hence they could be used for food preservation as main or adjuvant antimicrobial substances.

In addition to imparting flavour, certain herbs prolong the shelf life of foods due to their bacteriostatic or bacteriocidal activity and prevent rancidity by their antioxidant activity (Shelef *et al.* 1980)^[6]. This approach enhances safety of the foods (Farag *et al.* 1990)^[3]. Therefore, the present study has been contemplated to select stage for addition of turmeric, a well-known antibiotic in paneer and to evaluate turmeric as a preservative for paneer.

Materials and Methods

The present study was conducted on the studies on preparation of turmeric incorporated paneer at Department of Animal Husbandry and Dairy Science, Post Graduate Institute MPKV rahuri the year 2019-20. The material used and methods employed for conducting the experiments are as follows.

Materials

Fresh, clean, composite samples of milk of crossbred cow was obtained from herd maintained at Research Cum Development Project (RCDP) on Cattle, Department of Animal Husbandry and Dairy Science, MPKV, Rahuri, Dist. Ahmednagar (MS). The turmeric powder, LR grade Citric acid and ionized salt were procured from local market, Rahuri.

Phase I - Preliminary trials

A) Selection of Level of Turmeric powder

According to Shweta Buch, Sunita Pinto and K. D. Aparnathi (2014) [1] in the first part of study, turmeric was incorporated in the product at the rate of 0.2, 0.4, 0.6 and 0.8, 1.0 by weight of expected yield of product. On the basis of sensory evaluation; slight modification was done in the quantity of turmeric powder. Various levels of turmeric powder were tried and paneer samples were prepared. The samples were subjected to sensory evaluation to finalize the level of turmeric powder. Based on the sensory evaluation result based rated four levels of turmeric will be used for the final experimental trial.

B) Stage of addition of turmeric

Turmeric was incorporated at different stages during paneer making

1. Before heat treatment of milk.
2. After heating of milk.
3. After heat treatment of milk but before addition of coagulant.
4. Directly into the coagulum.
5. Dipping of paneer blocks in turmeric containing chilled water instead of plain chilled water.

Based on the sensory evaluation result best stage of turmeric addition was used for the Final experimental trial.

Methods

Treatments included different combinations like; Whereas,

T₀ = Paneer without turmeric powder (control)

T₁ = 0.2% turmeric powder by expected weight yield of paneer

T₂ = 0.4% turmeric powder by expected weight yield of paneer

T₃ = 0.6% turmeric powder by expected weight yield of paneer

T₄ = 0.8% turmeric powder by expected weight yield of paneer

Procedure for preparation of turmeric incorporated paneer

The standardized milk sample was taken in stainless steel container. It was heated to 40 °C, then filtered and again heated to 90 °C for 10 min. Milk allowed cooling up to 70 °C and immediately addition of turmeric powder as per treatment, just before coagulation of milk and stirred it to avoid formation of lumps. Citric acid at the rate of 2 g per litre was used as coagulant and added in milk. Then it was allowed to coagulate. After coagulation, whey was drained through muslin cloth and coagulum was separated. Coagulum then pressed by using in pressing machine by using weight. Paneer prepared was kept in brine solution for 1-1.5 hrs @ 4±1 °C. The block of paneer was cut and stored.

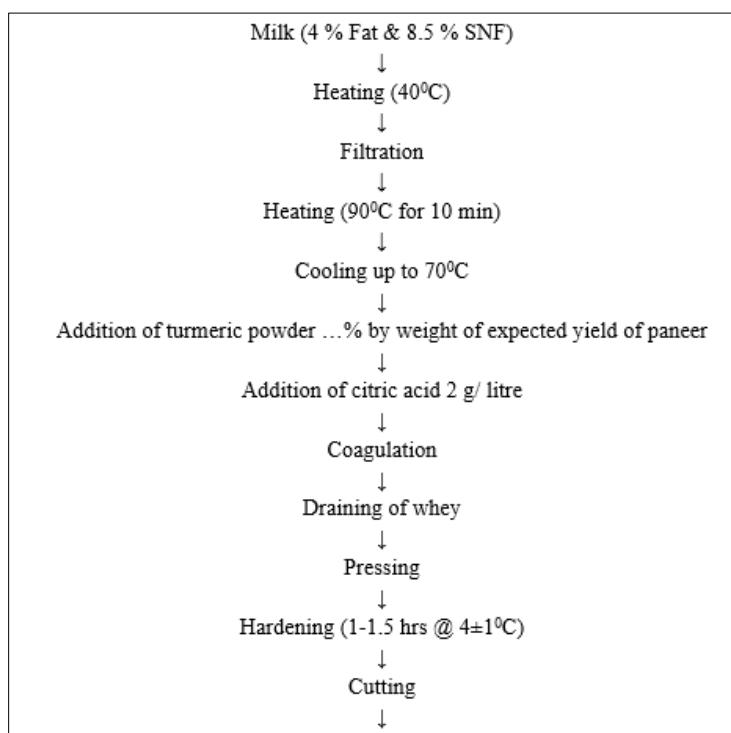


Fig 1: Flow chart for preparation of turmeric incorporated paneer

The observations were recorded for colour, general appearance and overall acceptability on the basis of 9 point hedonic scale (Nelson and Trout, 1964) [5].

Results and Discussion

A) Sensory evaluation of paneer samples

9 point hedonic scale was used for sensory evaluation of trials by using attributes like colour and appearance, body and texture and flavour. The results obtained were tabulated and analysed as follows:

a) Colour and appearance

The mean values for colour and appearance was ranged from 6.64 (T₄) to 8.46 (T₀). Treatment T₀ had obtained the highest score (8.46) while treatment T₄ got lowest score (6.64) presented in table 1. Treatment T₀ (control) was significantly superior over rest of all the treatments at 5% level of significance. Treatment T₁ (0.2% turmeric powder), Treatment T₂ (0.4% turmeric powder) and treatment T₄ (0.8% turmeric powder) were at par with each other. The score of the paneer was affected by addition of turmeric powder. The

colour of treatment T₀ was marble white. The intensity of yellow colour was increased as the level of turmeric powder increased. The similar results were reported by Shweta butch *et al.* (2012) reported that the sensory score for colour and appearance for paneer incorporated with turmeric. She reported that as the rate of turmeric addition increases from 0.2 per cent to 0.8 per cent the score for colour and appearance gradually decreasing as from 8 to 6.2.

b) Body and Texture

The mean values for body and texture ranged between 7.40 (T₄) and 8.44 (T₀). The highest score was obtained for the treatment T₀ (control) while treatment T₄ (controlled paneer) had lowest score i.e. 7.40. Body and Texture was affected greatly due to turmeric powder as it has anticoagulant properties but this problem has overcome by increased pressing time. As there was increased the moisture percentage of paneer, for removal of moisture pressing time was increased and hence Body and Texture was slightly affected. Similar research work were observed by research worker Shweta butch *et al.* (2012) reported that the sensory score for body and texture for paneer incorporated with turmeric. She observed that body and texture score for turmeric added paneer were lesser than control.

c) Flavour

The sensory score for the treatments ranged from 6.86 (T₄) to 8.60 (T₀). The highest score was found for the treatment T₀ i.e. 8.60 followed by treatment T₁ (8.44), T₂ (8.24), T₃ (8.20) and T₄ (6.86) as presented in table 1. Treatment T₀ was significantly superior over all other treatments at 5% level of significance followed by treatment T₁. Treatment T₂ (0.4% turmeric powder) and treatment T₃ (0.6% turmeric powder) were at par with each other at 5% level of significance. From the above mean values in table, significant difference was observed in mean values of treatments. Up to treatment T₃ turmeric powder giving better taste which had highest score for flavour. In T₄ the score decreased because the level of turmeric powder, giving sharp flavor of turmeric powder hence reduced the sensory score.

Paneer samples incorporated with turmeric powder had acquired higher sensory score up to T₃. Turmeric incorporated paneer samples were liked moderately by the panelists. The results were comparable with Shweta butch *et al.* (2012) reported the sensory score for flavor for paneer incorporated with turmeric. She reported that the sharp declined in flavour as the addition of turmeric from 0.6 per cent.

d) Overall acceptability

For overall acceptability, the highest score observed for treatment T₀ (control) and lowest score was obtained for the treatment T₄ (0.8% turmeric powder). Overall acceptability of treatment T₃ (0.6% turmeric powder) was also superiorly significant (P- value) over rest of all treatments at 5% level of significance. Treatments 0.2% (T₁) and 0.4% (T₂) were at par with each other. The overall acceptability score for paneer samples differed considerably, due to level of turmeric powder. Within the treatment T₃ has high score might be due to perfect level of turmeric powder which results into good combination of colour and appearance, body and texture and flavour. Shweta butch *et al.* (2012) reported the sensory score for overall acceptability for paneer incorporated with turmeric. She recorded as paneer incorporated with 0.6 per cent turmeric added was more acceptable than other

treatments.

B) Storage study of turmeric incorporated paneer by sensory basis

Each block of paneer packed separately into PET/LDPE film pouches and stored at 7±1 °C for 15th days. The prepared samples of paneer were subjected to sensory evaluation by panel of judges using 9-point hedonic scale when fresh and after at an interval of every 3rd day up to 15th day of storage as presented in table 2.

a) Effect of storage period on Colour and appearance of turmeric paneer

The mean sensory score for colour and appearance during storage was 8.46 (T₀) to 6.44 (T₄), 7.00 (T₀) to 6.00 (T₄), 7.50 (T₃) to 0.00 (T₀), 7.20 (T₃) to 0.00 (T₀), 6.25 (T₃) to 0.00 (T₀) for day 0, 3, 6, 9, 12th day of storage. That there was an adverse effect on colour and appearance of the samples of paneer as the storage period was increased. The control sample found superior among all treatments upto 3rd day of storage. This was because of absence of visible particles of herbal preservatives in control samples of paneer. The score for colour and appearance of samples of paneer declined at almost with same trend during the storage period.

b) Effect of storage period on Body and Texture of turmeric paneer

The mean sensory score for body and texture during storage was ranged from 8.44 (T₀) to 7.40 (T₄), 7.0 (T₀) to 6.00 (T₄), 7.40 (T₃) to 0.00 (T₀), 7.10 (T₃) to 0.00 (T₀), 6.50 (T₃) to 0.00 (T₀) for day 0, 3, 6, 9, 12th day of storage. The addition of turmeric found to reduce score of the body and texture of all sample of paneer. This effect may be due to interference of particles of turmeric in development of body and texture of the paneer as turmeric has anticoagulant property due to more moisture remain in paneer and to overcome this we had to increase pressing times which affect texture. Similar results were reported by Shweta butch *et al.* (2012) reported the sensory score for overall acceptability for paneer incorporated with turmeric. As the day interval passes sensory score for body and texture shows decreasing trend. Sensory score of paneer with 0.6% turmeric remain acceptable on 12th day of storage; however, these samples were found spoiled on 15th day of storage.

c) Effect of storage period on Flavor of turmeric paneer

The flavor scores of refrigerated stored samples of paneer are depicted in Table 2. the mean sensory score for flavour during storage was ranged from 8.60 (T₀) to 6.86 (T₄), 6.40 (T₀) to 5.10 (T₄), 7.50 (T₃) to 0.00 (T₀), 7.00 (T₃) to 0.00 (T₀), 6.55 (T₃) to 0.00 (T₀) for day 0, 3, 6, 9, 12 of storage. The flavour score of control sample of paneer declined sharply from beginning of the storage. The score reduced from 8.60 to 6.40 in 6th days of storage and later it becomes unacceptable due to visible yeast and mould growth. T₁ and T₂ treatment remains acceptable upto day 6 and day 9 respectively.

d) Effect of storage period on overall acceptability of turmeric paneer

The overall acceptability scores of refrigerated stored samples of paneer are depicted in Table 2. the mean sensory score for overall acceptability during storage was ranged from 8.84 (T₀) to 6.42 (T₄), 5.05 (T₀) to 8.05 (T₄), 7.60 (T₃) to 0.00 (T₀), 7.25 (T₃) to 0.00 (T₀), 6.50 (T₃) to 0.00 (T₀) for day 0, 3, 6, 9, 12 of

storage. The score of overall acceptability of control shown highest rate of decrease in overall acceptability. The treatment

T₃ shown minimum decreasing trend in score during storage period.

Table 1: Effect of turmeric powder on sensory evaluation and overall acceptability of paneer

Treatments Proportion	Colour and Appearance	Parameters Body & Texture	Flavour	Overall acceptability
T ₀ (Control)	8.46 ^a	8.44 ^a	8.60 ^a	8.84 ^a
T ₁ (0.2% TP)	8.30 ^b	8.28 ^b	8.44 ^b	8.22 ^c
T ₂ (0.4% TP)	8.12 ^c	7.95 ^c	8.24 ^c	8.18 ^d
T ₃ (0.6% TP)	8.08 ^d	7.70 ^d	8.20 ^d	8.36 ^b
T ₄ (0.8% TP)	6.64 ^e	7.40 ^e	6.86 ^e	6.42 ^e
SE (m) ±	0.177	0.048	0.054	0.106
CD at 5%	0.525	0.144	0.162	0.316

(TP-Turmeric Powder)

Table 2: Effect of storage period on sensory parameters of turmeric incorporated paneer

Treatment/ Days	Sensory parameters															Overall Acceptability								
	Colour and appearance					Body and Texture					Flavour													
	0 th	3 rd	6 th	9 th	12 th	15 th	0 th	3 rd	6 th	9 th	12 th	15 th	0 th	3 rd	6 th	9 th	12 th	15 th						
T ₀	8.46 ^a	7.00 ^b	0.00 ^c	0.00 ^d	0.00 ^c	-	8.44 ^a	7.05 ^d	0.00 ^e	0.00 ^d	0.00 ^c	-	8.60 ^a	6.40 ^c	0.00 ^e	0.00 ^d	0.00 ^c	-	8.84 ^a	8.05 ^a	0.00 ^d	0.00 ^d	0.00 ^c	-
T ₁	8.30 ^b	7.50 ^b	6.00 ^c	0.00 ^d	0.00 ^c	-	8.28 ^b	7.90 ^a	7.20 ^c	0.00 ^d	0.00 ^c	-	8.44 ^b	7.90 ^b	6.80 ^c	0.00 ^d	0.00 ^c	-	8.32 ^b	6.10 ^c	0.00 ^d	0.00 ^d	0.00 ^c	-
T ₂	8.12 ^c	7.80 ^a	7.20 ^b	6.50 ^b	0.00 ^c	-	7.95 ^c	7.85 ^a	7.30 ^b	7.00 ^b	0.00 ^c	-	8.24 ^c	8.00 ^{ab}	7.10 ^b	6.50 ^b	0.00 ^c	-	8.18 ^c	7.90 ^b	7.00 ^b	5.05 ^b	0.00 ^c	-
T ₃	8.08 ^d	7.90 ^a	7.50 ^a	7.20 ^a	6.25 ^a	-	7.70 ^d	7.65 ^b	7.40 ^a	7.10 ^a	6.50 ^a	-	8.20 ^d	8.05 ^a	7.50 ^a	7.00 ^d	6.55 ^a	-	8.36 ^d	8.05 ^a	7.60 ^a	7.25 ^a	6.50 ^a	-
T ₄	6.44 ^e	6.00 ^d	5.20 ^d	5.00 ^c	4.25 ^b	-	7.40 ^e	7.30 ^c	7.05 ^d	6.80 ^c	3.05 ^b	-	6.86 ^e	5.10 ^d	4.25 ^d	3.90 ^c	3.40 ^b	-	6.42 ^e	5.05 ^d	4.20 ^c	4.00 ^c	3.25 ^b	-
SE(+)	0.177	0.057	0.044	0.029	0.220	-	0.048	0.035	0.024	0.028	0.019	-	0.054	0.034	0.035	0.033	0.016	-	0.106	0.037	0.036	0.024	0.052	-
CD@ 5%	0.525	0.170	0.129	0.088	0.066	-	0.144	0.105	0.073	0.082	0.056	-	0.162	0.101	0.105	0.099	0.047	-	0.316	0.110	0.107	0.073	0.156	-

The overall acceptability score of control samples of paneer shown acceptable level (6.10) on 3rd day of storage and 6th day of storage it shown yeast and mould growth. The T₄ highest treatment remains unacceptable from 3rd day of storage up to 12th day of storage. However, the score for the overall acceptability of treatment T₃ remained above the acceptable level (6.50) on 12th day of the storage and spoil on 15th day of storage.

Conclusion

The paneer prepared by adding 0.6 per cent turmeric powder showed highest overall acceptability sensory score 8.36. The sensory quality of paneer prepared by addition of 0.6 per cent having score for colour and appearance 8.08, flavour 8.20, body and texture 7.70 and overall acceptability 8.36. The paneer sample with 0.6 per cent turmeric weight of expected yield of paneer remains acceptable upto 12th day of storage at refrigerated temperature.

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